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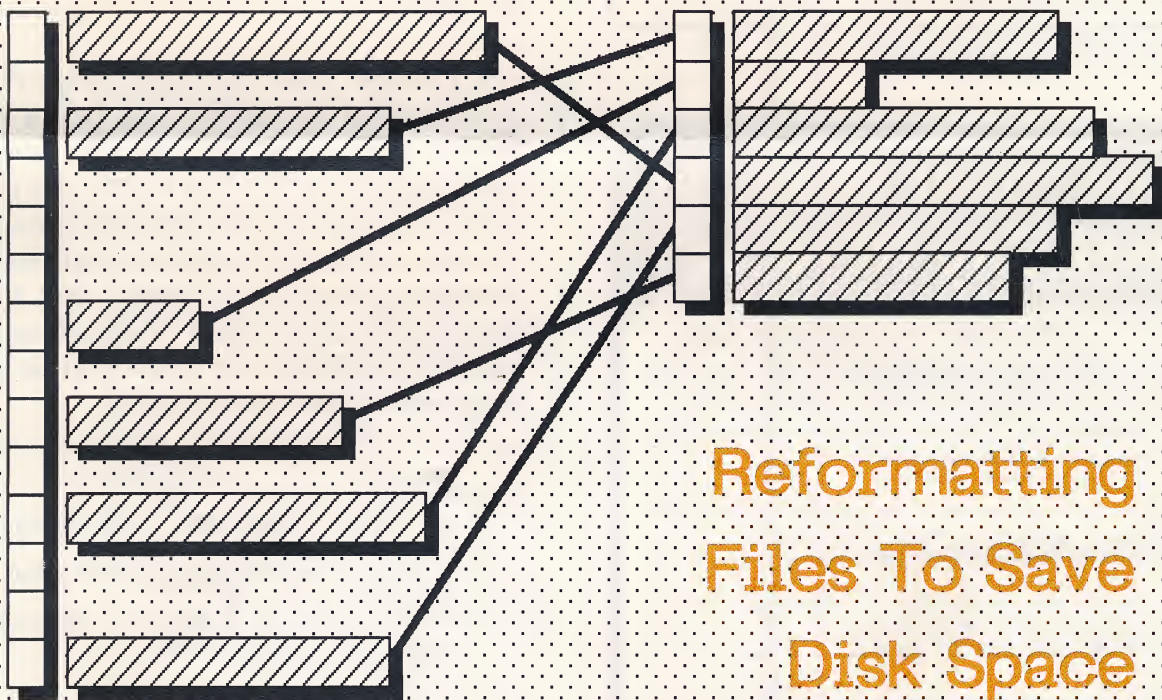
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PRODUCT PROFILES

News And Information For Pick™ Operating System Users

Issue Number 16

July 1985



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Save Disk Space By Reformatting Files

Imagine an item with only two non-null attributes: a five character string in attribute one, and a six digit number in attribute nine. That sounds like a total of only eleven bytes worth of data, but in fact eight other delimiter bytes are created by the system to denote the seven null attributes between the two pieces of data in the first and ninth attributes. That means that disk space is used up even by null attributes (when they're positioned between non-null data). A large amount of disk space can be wasted in poorly designed files, where lots of null attributes frequently occur within items. By reformatting files so that the most frequently used attributes are at the start of an item, null attributes are avoided and disk space can be saved.

The program listed below is called PROFILE and is useful for determining how a file should be reformatted. PROFILE simply scans every item in a file and builds and prints a table showing the occupied attributes. (The routine in lines 8 to 24 is a Shell sort for reordering the dynamic arrays that form the columns of output data. Programmers might want to duplicate this code in other programs that need a fast sort routine.)

```
PROFILE
01 CRT "DICT or DATA": ; INPUT DD
02 CRT "File": ; INPUT FILE ; OPEN DD,FILE ELSE STOP
03 ITEMS=0 ; SELECT
04 EXIST="" ; AVG="" ; MAX="" ; MAX.ATR=0
05 100 READNEXT ID ELSE
06   AMC="" ; FOR I=1 TO MAX.ATR ; AMC<I>=I ; NEXT I
07   GOSUB 200 ; * Print by AMC
08   GAP=INT(MAX.ATR/2)
09   LOOP WHILE GAP > 0 DO
10     FOR I=GAP+1 TO MAX.ATR
11       J=I-GAP
12       LOOP WHILE J > 0 DO
13         JG=J+GAP
14         IF EXIST<J> < EXIST<JG> THEN
15           X=EXIST<J>; EXIST<J>=EXIST<JG>; EXIST<JG>=X
16           X=AMC<J>; AMC<J>=AMC<JG>; AMC<JG>=X
17           X=AVG<J>; AVG<J>=AVG<JG>; AVG<JG>=X
18           X=MAX<J>; MAX<J>=MAX<JG>; MAX<JG>=X
19           J=J-GAP
20         END ELSE J=0
21       REPEAT
22     NEXT I
```


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LOCATION		HISTORICAL	
1975	1375	1975	1375
1976	1376	1976	1376
1977	1377	1977	1377
1978	1378	1978	1378
1979	1379	1979	1379
1980	1380	1980	1380
1981	1381	1981	1381
1982	1382	1982	1382
1983	1383	1983	1383
1984	1384	1984	1384
1985	1385	1985	1385
1986	1386	1986	1386
1987	1387	1987	1387
1988	1388	1988	1388
1989	1389	1989	1389
1990	1390	1990	1390
1991	1391	1991	1391
1992	1392	1992	1392
1993	1393	1993	1393
1994	1394	1994	1394
1995	1395	1995	1395

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PROFILE (CONTINUED)

```

23  GAP=INT(GAP/2)
24  REPEAT
25  GOSUB 200 ;* Print by percentage
26  STOP
27  END
28  ITEMS=ITEMS+1
29  READ RECORD FROM ID ELSE STOP "READ ERROR"
30  ATR=COUNT(RECORD,CHAR(254))+1
31  IF ATR > MAX.ATR THEN MAX.ATR=ATR
32  FOR I=1 TO ATR
33  LENGTH=LEN(RECORD<I>)
34  IF LENGTH > 0 THEN
35  EXIST<I>=EXIST<I>+1
36  AVG<I>=AVG<I> + LENGTH
37  IF LENGTH > MAX<I> THEN MAX<I>=LENGTH
38  END
39  NEXT I
40  GO TO 100
41  *
42  200 * Output table
43  PRINT "          AVG  MAX"
44  PRINT " AMC EXIST %  LEN  LEN"
45  FOR I=1 TO MAX.ATR
46  PRINT AMC<I> "R#3":
47  PRINT EXIST<I> "R#7":
48  IF EXIST<I> > 0 THEN
49  PRINT ICONV(EXIST<I>/ITEMS,"MD2") "R#4":
50  PRINT ICONV(AVG<I>/EXIST<I>,"MD0") "R#5":
51  PRINT MAX<I> "R#5"
52  END ELSE PRINT
53  NEXT I
54  PRINT
55  RETURN
56  END

```

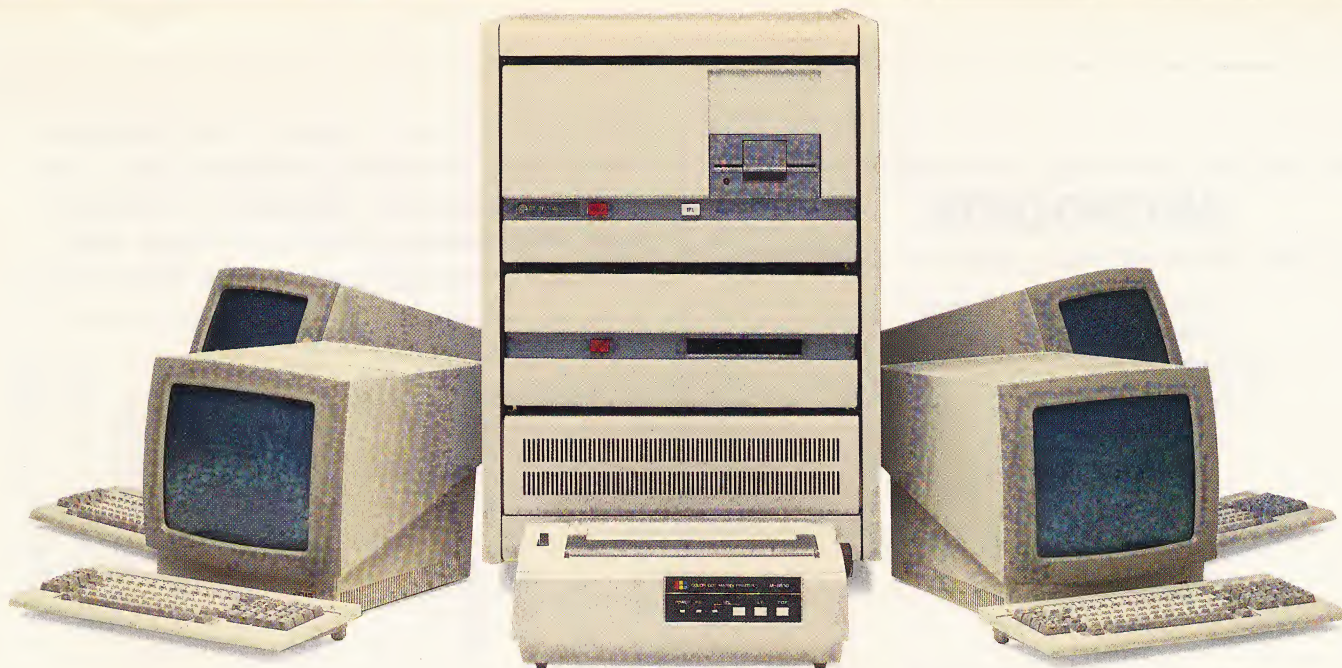
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PROFILE outputs a table of file attributes twice, first in existing attribute order, then again but sorted by frequency of attribute use. For example, here's the output after processing the dictionary of the STAT-FILE:

			AVG MAX	
AMC	EXIST	%	LEN	LEN
1	27	100	1	2
2	27	100	2	5
3	17	63	7	14
4	1	4	1	1
5				
6				
7	12	44	4	12
8	10	37	14	35
9	27	100	1	1
10	27	100	1	2
11	1	4	1	1

			AVG MAX	
AMC	EXIST	%	LEN	LEN
1	27	100	1	2
2	27	100	2	5
9	27	100	1	1
10	27	100	1	2
3	17	63	7	14
7	12	44	4	12
8	10	37	14	35
11	1	4	1	1
4	1	4	1	1

We can see that attributes five and six are never used in the 27 dictionary items, that attributes four and eleven are used only once, and that correlatives (in attribute eight) occur in just over a third of the items. The second table shows that dictionary items (at least for the STAT-FILE) would have fewer null attributes and be less wasteful of space if the data currently stored in attributes nine and ten were instead positioned just after attribute two.

When we used the REFORMAT verb on the STAT-FILE dictionary, we found PROFILE's suggested attribute ordering results in a savings of 110 bytes, or just over four bytes per item. Of course, dictionary formats are fixed by the operating system, and can't be changed by a user. But the format of a user's own file items can be adjusted at any time, as long as any associated programs are also changed to take the new attribute layout into account. While squeezing a byte or two out of an item might sound like a lot of trouble for small files, it can be worth it for large files. For example, PROFILE let us discover one file of over 30,000 items on our system that uses attribute 26 in 100% of the items, but has no data in many of the preceding attributes. REFORMAT revealed a potential savings of about ten bytes per item if attributes were reordered. In other words, about 600 disk frames were being wasted on null attributes in that one file alone! Δ

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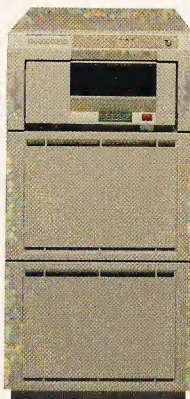


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